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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/714,547	11/16/2000	Yuzuru Suzuki	SZI 2 0015	5502

7590

10/31/2002

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EXAMINER

NGUYEN, TRAN N

ART UNIT

PAPER NUMBER

2834

DATE MAILED: 10/31/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/714,547

Applicant(s)

SUZUKI ET AL.

Examiner

Tran N. Nguyen

Art Unit

2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 17 September 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-7 and 11-13 is/are pending in the application.
- 4a) Of the above claim(s) 13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-7, 11 and 12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1-3 and 11-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al (US 5,770,900) in view of Kawamoto et al (US 4,954,736) and Denk (US 4617726).

Sato discloses a stepping motor structure having inner rotor assembly (figs 1-2) that is substantially as the claimed invention. Sato differs from the claimed invention in only two respects as following:

- (a) *the magnets are rare earth magnets;*
- (b) *a rotor magnet comprising a plurality of discrete magnet segments, which are arranged apart from each other, wherein thermoplastic fills a space between a rotor shaft and each segment magnet and a space between adjacent segment magnets.*

Regarding respect (a), Denk teaches a rotor having rare earth permanent magnet rotor. Those skilled in the art would realize that motors having rotors with rare-earth magnets are well

known in the art because these motors able to achieve high output torques with increased field energization, yet with relatively low attendant risk of rotor demagnetization due to the inherent resistance to demagnetization of the rare-earth magnets. Moreover, rare-earth magnets render such motors more compact, lighter and more efficient. Furthermore, rotors having rare-earth permanent magnets are well known in the art.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the Sato's motor by embodying the inner rotor with rare earth permanent magnet material, as taught by Denk. Doing so would enable to motor to be more efficient with high output torque while maintaining the motor to be compact in size and light in weight.

Regarding respect (b), Kawamoto, however, teaches an inner rotor assembly (figs 1-5) comprising a rotor (10) comprising a plurality of discrete magnet segments (17a-17d) which are arranged apart from each other by thermoplastic material, which is thermosetting resin molding (18), wherein as clearly shown in figs 1-3, thermosetting resin (18) is filled in a circumferentially extended space, formed with recesses (15a-15d), located between the rotor shaft (11) and each segment magnet (17a-17d) and a radially extended space between adjacent segment magnets. Furthermore, the inner circumferential edge of each magnet segment is longer than the outer circumferential edge thereof to accommodate the fastening projections and the thermoplastic resin bonding therebetween. Kawamoto teaches that the inner rotor assembly would be sufficiently durable under high-speed revolution with magnets mounted at a sufficiently high holding force.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the Sato's motor by embodying the inner rotor having a plurality of discrete magnet segments arranged apart from each other by thermosetting resin molding, wherein the inner circumferential edge of the magnet segment is longer than the outer circumferential edge thereof, as taught by Kawamoto. Doing so would provide a motor with high structure integrity, particularly a rotor that would be sufficiently durable under high-speed revolution with magnets mounted at a sufficiently high holding force.

3. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato, Denk and Kawamoto, as applied in the rejection against the base claim, and further in view of Mitcham et al (US 5,877,578).

The combination of **Sato and Kawamoto** refs substantially discloses the claimed invention, except for the added limitations of *recessed portions are provided on the circumferential sides of the magnet segment*.

Mitcham, however, teaches a rotor having a magnet segments (20) provided with recessed portions (28) for ensuring the abutment of the magnets and preventing any relative physical movement of the magnet segments.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the motor by configuring the magnet segments with recessed portions are provided on the circumferential sides thereof, as taught by Mitcham. Doing so would provide means for ensuring the abutment and preventing any relative physical movement of the magnet segments.

4. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato, Denk and Kawamoto, as applied in the rejection against the base claim, and further in view of Molnar (US 5,881,448).

The combination of **Sato and Kawamoto** refs substantially discloses the claimed invention, except for the added limitations of *positioning means provided on an axial end surface of the rotor for magnetization of segment magnets*.

Molnar, however, discloses a rotor having magnetization positioning means (36a-36c) provided on an axial end surface of the rotor for magnetization of segment magnets for locating the magnetization orientation of the magnets.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the motor by configuring the rotor with magnetization positioning means provided on an axial end surface of the rotor, as taught by Molnar. Doing so would enable for easily locating the magnetization orientation of the magnets in the rotor.

5. **Claims 6-7** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato, Denk and Kawamoto, as applied in the rejection against the base claim, and further in view of level of ordinary skills of a worker in the art.

The combination of **Sato and Kawamoto** refs substantially discloses the claimed invention, except for the added limitations of the following:

- (a) *the magnet segments are made of a rare earth magnet;*
- (b) *the thickness of the magnet segment is set to be equal to or smaller than one-half of a magnetic pole pitch.*

Regarding the limitations of subsection (7a), those skilled in the art would know that rotor with a rare-earth magnet material is well known in the art. Furthermore, selecting a suitable material for a disclosed component is a matter of obvious engineering design choice; this is evidently disclosed in the specification.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select a rare-earth magnet for fabricating the rotor magnet because rare-earth magnet is well known for its strong magnetic characteristics. Furthermore, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding the limitations of subsection (7b), those skilled in the art would understand that the dimensions of the rotor permanent magnet depend of size of the air gap between the rotor and the stator and of the pole pitch. While the pole pitch depends of other factors such as sizes of the stator and the rotor, or of orientation of the magnets with respect to the pole pitch, or of the configuration of the magnetic poles and their windings for a required output power. Thus, it would have been obvious, as a matter of engineering design choice, to configure the magnet with a workable range of thickness to ensure efficiency performance of the rotor.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to configure the magnet segment with a thickness within the range of be equal to or smaller than one-half of a magnetic pole pitch. Doing so would ensure the efficiency performance of the rotor. Furthermore, it has been held that where the general conditions of a

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claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Response to Arguments

Applicant's arguments filed on 9/17/02 have been fully considered but they are not persuasive. The applicant argues the following:

the Kawamoto's rotor having rotor laminated yoke and holding projections (13a-13d), while the present invention does not have any rotor core, except for the sleeve (12) and the thermoplastic filled in the space between the shaft and the magnet segments and a space between the adjacent magnets.

the applicant is correct when stating that the present invention does not have any rotor core, except for the sleeve (12). However, *this is irrelevant* because the claimed language does not positively recite any limitations relating to the rotor **not** having a yoke.

be-tween (bî-twên¹) *preposition*

Abbr. bet.

1. **a.** In or through the position or interval separating: *between the trees; between 11 o'clock and 12 o'clock.* **b.** Intermediate to, as in quantity, amount, or degree: *It costs between 15 and 20 dollars.*
2. *Usage Problem.* Connecting spatially: *a railroad between the two cities.*
3. *Usage Problem.* Associating or uniting in a reciprocal action or relationship: *an agreement between workers and management; a certain resemblance between the two stories.*
4. **a.** By the combined effort or effect of: *Between them they succeeded.* **b.** In the combined ownership of: *They had only a few dollars between them.*
5. *As measured against. Often used to express a reciprocal relationship: choose between riding and walking.*¹

Definition (1), read as "in or through the position or interval separating" seems to be the appropriate interpretation for the term "between" in the recited limitations of "*the thermoplastic*

¹ *The American Heritage® Dictionary of the English Language, Third Edition* copyright © 1992 by Houghton Mifflin Company. Electronic version licensed from INSO Corporation; further reproduction and distribution restricted in accordance with the Copyright Law of the United States. All rights reserved.

filled in the space between the shaft and the magnet segments and a space between the adjacent magnets.” That is the above recitation is understood as “thermoplastic filled in the space that is in the position separating the shaft and the magnet segments and a space that is in the position separating the adjacent magnets.

Based on this interpretation, the newly added limitations of thermoplastic fills a space between a rotor shaft and a space adjacent segment magnets is read in the Kawamoto reference as following:

Regarding the space between the shaft and the magnets filled with resin, Kawamoto discloses a circumferentially extended space, formed with recesses (15a-15d), wherein this circumferentially extended space located *in the position separating* the shaft and the magnet segments, and the spaced is filled with thermosetting resin (18), as shown in figs 1-2.

By the same token, Kawamoto discloses the radially extended space that is located *in the position separating* adjacent magnets (17a-17d), wherein this space filled with thermosetting resin (18), as shown in figs 1-2.

Thus, Kawamoto’s rotor meets the limitations of *the thermoplastic filled in the space between (i.e., in the position separating) the shaft and the magnet segments and a space between (i.e., in the position separating) the adjacent magnets.*

Whether any subject matter located within the space *that is in the position separating* the shaft and the magnets, or the space *that is in the position separating* the adjacent magnets is irrelevant because the claimed language does not recite a space containing no subject matter related to or part of rotor. The claimed language also does not recite the boundaries of a space. That is a space located *intermediately between the surface of the shaft and the inner surface of the magnets* or a space located *intermediately between two surfaces of respective sides of adjacent magnets.*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

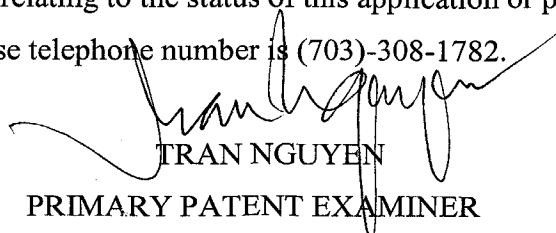
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Communication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tran N Nguyen whose telephone number is (703) 308-1639. The examiner can normally be reached on M-F 6:00AM-2:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nestor Ramirez can be reached on (703)-308-1371. The fax phone numbers for the organization where this application or proceeding is assigned are (703)305-3431 for regular communications and (703)-395-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)-308-1782.


TRAN NGUYEN
PRIMARY PATENT EXAMINER
TC-2800